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RELEASE FOR PUBLICATION
FEBRUARY 6, 1935 (WEDNESDAY)

THE MARKET BASKET
by
Bureau of Home Economics, U. S. Department of Agriculture

FAMILY FOOD GUIDE TO LOW-COST BALANCED DIET

Every meal -- Milk for children, bread for all

Every day --
Cereal in porridge or pudding
Potatoes
Tomatoes (or oranges) for children
A green or yellow vegetable
A fruit or additional vegetable
Milk for all

Two to four times a week --
Tomatoes for all
Dried beans and peas or peanuts
Eggs (especially for children)
Lean meat, fish, or poultry, or cheese

COOKING THE STARCHY FOODS

It may be true, as some people say, that good cooks are born, not made. But the born cook will be the first to acknowledge that there is much she can learn about her art. The science of it, for instance, if she has not had a college course in chemistry and physics. Why do we cook food at all? What happens when we boil a potato? Why do we do one thing to starchy foods like oatmeal, flour or potatoes, and something else to meats? What causes the trouble when fats get too hot, and why?

One of the principal reasons why we cook so many of our foods is that we like the cooked foods better. Few of us care to eat raw meat or raw potatoes or plain lard or suet. They are not palatable until cooking changes the flavor and the texture to suit our taste. It is true that in nutritive value, nothing is added by cooking and usually something is lost. Some foods, however, are made more

digestible by cooking, and certain dangerous bacteria or parasites that may be present are destroyed by heat.

In fact, primitive cooking marked a step in man's civilization, and scientific cooking goes several steps farther. To the talents of the born cook, who gets good results by means of her imagination, experience and skill, science adds knowledge of what foods are made of, and why the results of cooking are what they are.

In other words, says the Bureau of Home Economics of the U. S. Department of Agriculture, when it comes to cooking the contents of your market basket, or the products of your farm or garden, you treat them according to what they are <u>chiefly</u> made of. The substances that are found in largest quantity in the composition of most foods are either carbohydrates or proteins or fats. So one set of cooking principles applies to the "carbohydrate foods", another set to the "protein foods", and still another to the fats. Let's see what this means so far as the carbohydrate foods are concerned, particularly the starchy ones.

To the chemist carbohydrates are compounds of carbon, hydrogen and oxygen and there are many of them throughout the vegetable kingdom. But in cookery the carbohydrates of most concern are starch, sugar, and the plant-structure material called cellulose. Cereals and potatoes are composed largely of starch. Candy is chiefly sugar. All the plant foods--vegetables or fruits--have a structure of cellulose, whether they are roots, stalks, leaves, fruit or seeds. In cookery, therefore, all the vegetables and fruits are treated as "carbohydrate foods".

Most of the starchy foods are tasteless until cooked. It takes heat to develop their flavor, so you cook oatmeal, for example, or whole wheat, or rice or barley or corn meal or flour, or potatoes. You cook them either with moist heat, which is to say in water or steam, or with dry heat, as when you bake them. The cereal products are dry, and, to get the results you want, you cook them in water,

which is absorbed until the tiny, invisible starch granules swell and soften. But you must treat the starch in such a way that the water and the heat can reach the granules evenly. Otherwise you will have lumps, which will be dry inside and hard and tasteless because uncooked.

Oatmeal or any of the coarser-grained cereal products are easy to cook because you need only to add them gradually to boiling water and let the bubbling of the water keep the grains apart, with occasional stirring, to prevent the lumps from forming. But when you are making gravy or white sauce or pudding, with flour or corn-starch thickening, you have to use a different method. Flour and corn-starch are ground so fine that if they are put directly into hot liquid the outside grains, as they strike the liquid, cook and form lumps enclosing raw starch inside. To avoid the lumps, you separate the starch grains first by mixing them with cold water, or else with fat, or for some purposes with sugar. When you add this mixture to the hot liquid, the starch grains cook separately before they can form lumps. Stir until the hot mixture boils, and continue cooking until the raw starch taste is gone--then you have a smooth gravy, or sauce, or pudding, as the case may be. That is one of the fundamentals of starch cookery.

When you make a lemon pie you encounter another principle. The filling is a mixture of sugar, water, eggs and a little fat, thickened with corn-starch, and flavored with lemon juice. But acid thins a mixture that is thickened with starch, because it turns the starch into something else--into "dextrins", which are substances that do not thicken. This is one reason why you cook the starch-thickened filling for lemon pie <u>before</u> you add the lemon juice.

When you bake a starchy food the "dextrins" come into the picture again. Moist heat causes starch to swell, but dry heat--browning--turns starch into dextrins, just as acids do. The browned surface of a loaf of bread or of a piece of toast is "dextrinized". So is the flour you brown to make brown gravy. It is for

this reason that brown gravy does not thicken readily, and you use more browned flour than white to make a gravy.

You brown, or dextrinize, foods to get a flavor you like. If, however, you brown them to the point of burning, you get a flavor and texture you probably do not like. You have destroyed the dextrins--you have "carbonized" them.

Potatoes, unlike cereals, contain a great deal of water with their starch, and they have a skin which prevents evaporation of the water when you cook them in the dry heat of the oven. The structure, or framework of the potato, as of other plant foods, is cellulose, a carbohydrate which softens when heated with moisture. Thus the effect of heat on the potato is to soften the cellulose at the same time it develops flavor in the starch. In addition, the outer surface of the potato is slightly browned, or dextrinized, developing additional flavor. That is why the baked potato tastes different from potatoes cooked in water. It is really cooked in its own juice, within its own shell, and browned on the surface.

When you boil pared potatoes you still cook them in their own juice, for the water you add serves to conduct heat and prevents too rapid evaporation of the water in the potato, thus keeping the potato itself from browning or burning.

When you fry potatoes, the surface is browned or dextrinized, while the starch inside cooks in its own water and the cellulose inside is softened. What happens to the fat in which the potato is browned is another story--but it gives an additional flavor, peculiar to fried foods. In potato chips or shoestring potatoes, because they are cut so thin, the starch is practically all dextrinized, and they are browned clear through. They are crisp because the heat has driven the water out of them until they are very dry.

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THE MARKET BASKET

by

Bureau of Home Economics, U. S. Department of Agriculture

FAMILY FOOD GUIDE TO LOW-COST BALANCED DIET

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WHEN YOU COOK SUGAR

Sugar is a food that has ways of its own--and they are ways the good cook must know about, says the Bureau of Home Economics of the U. S. Department of Agriculture. All fruits and some vegetables contain sugar, and so does milk, not to mention the countless foods and "made dishes" that are sweetened by adding sugar, the fruits that are canned or preserved in sugar sirup, and the candies and confections that are made of sugar.

Loose white granulated sugar, cube or tablet sugar, and powdered sugar are the commonest forms on the market. These are all refined sugar, so highly refined that their only flavor is sweetness and their only food value is their calories, or energy value. There is also brown sugar of different grades, some light, some dark.

White sugar is made from both sugar cane and sugar beets. It is exactly the same substance chemically, whichever the source, and behaves the same way in cooking. Experts who have tried to distinguish jellies and cakes made with cane sugar and with beet sugar were unable to do so.

Brown sugar is partially refined cane sugar. The different grades used to be sold as A, B, C, and D sugar, running from light cream color to very dark, moist brown, and varying in richness of flavor according to depth of color. Nowadays it comes as light brown and dark brown sugar, in grades known to the dealer as Nos. 8 to 15.

There is no brown sugar made from beets, for the beet sugar made by present processes is good only when refined.

The chemical name for cane sugar and beet sugar is sucrose. It is a carbohydrate, but it behaves differently from starch. For one thing, sucrose dissolves in cold water (as starch does not), and still more easily in hot water. You make use of this fact in cleaning sticky pans and dishes, and also, the other way round, when you make sugar sirup. As white sugar has no flavor except its sweetness, however, the sirup is just a sweet liquid--a solution of sugar and water, thickened by cooking.

This sugar sirup is wonderfully useful, however, in cooking, canning, and preserving fruit. If you cook fruit in water it goes to pieces and you get a sauce. But if you drop it into hot sirup, it takes up some of the dissolved sugar and the flesh stiffens enough to hold together while cooking in the sirup--which of course is thicker than water. You cook fruit this way for today's dinner, or for canning. Or you cook it longer, in a thicker sirup, to make preserves.

As to sugar flavor, moreover, you can develop it by melting the sugar. This you do by heating dry sugar until it turns into the clear liquid which is called "barley sugar." Heat this "barley sugar" a little more and it will caramelize

slightly, with a new flavor and color of its own. Cool this liquid and it becomes very brittle--as when you make peanut brittle and other brittle candies. Or you can dissolve your melted sugar and make caramel sauce. When you bake a cake, or other sweet food, some caramelization takes place on the surface and makes the cake brown more quickly than it would otherwise--though some of the browning, of course, is due to the starch in the flour with which the cake is made.

When you cook sugar (sucrose) with fruit or any other acid--cream of tartar, for example--you produce "invert sugar." The chemical action which takes place breaks up the sucrose into two other sugars, dextrose and levulose. Dextrose has other names. It is sometimes called glucose, and sometimes grape sugar because it is found in grapes. Levulose is also called fructose or fruit sugar.

Ordinary sugar when cooked crystallizes unless you prevent it. Invert sugar does not crystallize readily. Therefore, when you do not want candy to crystallize, or "go to sugar", you add acid (vinegar or cream of tartar), and produce enough invert sugar to do the trick. Or you can add corn sirup.

The sirups have their uses in cookery as well as on the table with hot breads and pancakes. You make ginger bread, brown bread, puddings, and spiced cakes with molasses or sorgo. You flavor sauces and candies with maple sirup, you use corn sirup to keep your candies and frostings from "going to sugar." From the standpoint of their behavior in cooking, one difference between the sirups is the amount of acid they contain. Molasses and sorghum sirup contain the most, and it is because of this acid that you use soda for leavening your gingerbread, cakes, or puddings that are made with these sirups.

As to table sirups, the many varieties on the market make it worth while to know just what is what among these products. Cane sirup, sorghum sirup and maple sirup, properly so called, are not made from sugar as such but are the concentrated juice of the sugar cane, sorghum and sap of the sugar maple tree,

before any sugar is taken out. The law prohibits the use of these names in labels on sirup made from the sugar instead of the juice.

Molasses is the "mother liquor" left from the cane juice after the raw sugar has been taken out. In the refinery, another crystallization leaves a liquor which is sold as "refiners' sirup," thinner and less sweet than molasses.

Corn sirup is a part of many of the table sirups you buy. It is manufactured from corn starch, largely turned to sugars (dextrose, or glucose, and maltose) which are not very sweet. It is usually flavored with "refiners' sirups" or maple sirup, or perhaps cane or maple sugar.

Honey, a natural sirup, is composed chiefly of levulose and dextrose (glucose), the two sugars that can be derived from sucrose. Levulose is much sweeter than the others, and this accounts for the sweetness of honey.

In food value, molasses, sorghum sirup and cane sirup are the best of the sirups because they contain most of the food substances other than sugar that are found in the sugar cane and the sorghum. They are especially good sources of iron.

Sugar has energy value only, and most of the candies and confections have little else. Therefore it is important to remember that concentrated sweetness cloys the appetite, and too much of it may keep you from eating the other kinds of foods you need to make up a balanced diet.

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by
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FAMILY FOOD GUIDE TO LOW-COST BALANCED DIET

Every meal -- Milk for children, bread for all

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Cereal in porridge or pudding	Tomatoes for all
Potatoes	Dried beans and peas or peanuts
Tomatoes (or oranges) for children	Eggs (especially for children)
A green or yellow vegetable	Lean meat, fish, or poultry, or cheese
A fruit or additional vegetable	
Milk for all	

WHY COOK VEGETABLES?

Why do we cook vegetables? Some people say we shouldn't, and it is true that cooking usually takes away some food values. For this reason the Bureau of Home Economics of the U. S. Department of Agriculture advises eating at least one raw vegetable or fruit each day -- to get food values you might lose in cooking.

But there are good reasons for cooking vegetables. You cook them to soften them, reduce their bulk, and make them easier to digest. At the same time, of course, you cook them to change the flavor to something you may like better than the raw taste. Also, you can cook them in such a way as to save practically all the food value.

With most vegetables, it is the fibrous structure you soften when you cook them. This fibrous structure is the invisible framework that gives shape and form, and holds together the other substances of the vegetable. In scientific cookery, this material is called cellulose. It is what we commonly call "roughage." It cannot be digested in the human body and is useful for that very reason. Its job is to furnish bulk of a kind that helps to eliminate the waste products of digestion.

In potatoes and sweetpotatoes, the cellulose is already so soft you can afford to forget about it. In kale or string beans, it is so coarse and there is so much of it you want to soften it to make it palatable. But whether the vegetable is a root like the carrot, a tuber like the potato, a bulb like the onion, stalks like celery, chard, broccoli and asparagus, seeds like peas, or fruit like the tomato; the cellulose is there in some form or other, and you cook the vegetable or eat it raw, according to the flavor you prefer,

and also according to whether you want your roughage soft or not.

You cook vegetables to soften the cellulose just enough to make it an agreeable carrier or container of the nutritive substances and the flavor in the food. Softening the cellulose also makes it less bulky. Incidentally, if you enjoy cooked vegetables and cook them in the way to avoid unnecessary loss of food value, you are likely to eat more of them than you would want of the raw ones. Thus you get almost as much in food values, all told, as from most of the vegetables you would want to eat raw.

One important point here for the cook, of course, is to know what cooking

does to minerals and vitamins, and therefore how to save all she can. So far as the minerals are concerned, they may cook out of the vegetable, but you need not lose them if you save the juice and use it, either with the vegetable, or in soup or sauce. If you "poor the water off," you pour off valuable calcium, phosphorus, iron, or some other mineral, maybe all of these. If you cook the vegetable very long, you may destroy two vitamins, B and C, that do not stand much heat or water. For vitamin C, vegetables are the best source, excepting only some of the fruits. Therefore add as little water as possible in cooking vegetables, cook only until the vegetable is just tender, though still a little crisp, and use all the liquid.

This is a good rule to follow even if you are thinking only of how they taste, without reference to food value. Long cooking makes the cellulose soft and mushy. And it changes, sometimes destroys, the original flavor of the vegetable. This happens with cabbage, or cauliflower, or brussels sprouts, or broccoli, or any of the cabbage family. Cabbage cooked for only five to fifteen minutes has a very delicate flavor and practically no odor. But cooked too long, a chemical substance in the cabbage decomposes into bad-smelling sulphur compounds, which go all through the house.

There are other vegetables in which too much cooking not only cooks up the cellulose too much but destroys the flavor, and leaves them more or less tasteless. The flavor may dissolve in the cooking water. Green peas, carrots, squash, onions and other vegetables containing sugar lose sweetness because the sugar dissolves so readily in water. For this reason steaming keeps in the flavor better than boiling--there is no water to take away the sugar.

You find a great difference, of course, between the cellulose in some young vegetables and the mature ones. Young carrots and young beets are tender. Winter carrots and winter beets are mature, are much less tender, and sometimes you find them more or less woody in the center. It is easy to cook the young vegetables whole in their skins and they lose less flavor then. But you may have to cut up the old carrots and the old beets in order to make them tender. Through the cut surfaces you lose more flavor and more food value. To prevent this as far as possible, cook cut-up vegetables in very little water and only until they are tender.

To keep the color in vegetables, there are several things to remember. Cooking green vegetables in hard water (alkaline) helps keep the green color, and usually the water we use is more or less hard. The alkali in the water neutralizes the vegetable acids which would otherwise, when heated, destroy the green color - that is, would decompose the chlorophyll, which is the coloring matter of the green parts of plants. Another way to help keep the green color is to leave the cover off your green peas or spinach or any other greens while they are cooking. Then some of the acids evaporate, without affecting the color. Green vegetables do lose color when steamed, however - there is no alkaline water to neutralize the acids,nor can they escape before they get in their work on the coloring matter.

Red vegetables - and this means red cabbage and red onions, but not tomatoes - need acid to preserve their color, so you add vinegar. Beets have acid enough to keep their color, but they "bleed" and lose color if they are cooked without their skins and in too much water. The red pigment in beets dissolves and runs out of the beet.

White vegetables become a bit less white in hard water, but yellow vegetables do not change color in cooking. Steam, boil or bake them, and the color stays - it is not changed and it does not dissolve. Tomatoes, as well as sweetpotatoes, carrots, yellow turnips and yellow squash, hold their color.

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PROTEIN COOKERY -- EGGS

Protein is one of the food substances necessary to life. It is needed for the building of muscles and other tissues of the human body. Plants can make it for themselves, out of the substances they take up from the soil, from air and water. We have to get ours from the plant or the animal foods we eat.

If we would be technical about it, we should say not protein but proteins, for there is a considerable variety of these compounds, and seldom do you find one by itself. White-of-egg is essentially a solution of proteins in water. The egg yolk contains other proteins. Meat contains several kinds; so do fish and fowl; so do milk and cheese and the legumes and nuts. This practically completes the list of foods which are commonly called protein foods. Cereals contain a good deal of protein, and all vegetables contain some.

When it comes to preparing the protein foods, of course, says the Bureau of Home Economics of the U.S. Department of Agriculture, it is necessary to know how the proteins behave. Most of the egg protein, for example, will dissolve in cold water. That is why you rinse a used egg cup in cold water when you want to clean it. Hot water coagulates the egg and makes it stick to the china. High temperature hardens most of the proteins. This is the fact that determines the method of cooking protein foods--the secret of success is in controlling the heat to keep them tender.

Some coagulation of protein takes place even without heat. This happens when you beat egg white to a foam. The beating makes the protein firmer, so that it holds the air. With too much beating the protein becomes dry and brittle and the foam finally breaks down.

Because egg proteins foam so easily, the egg white can be used as leavening. One egg will do the work of a half-teaspoon of baking powder in a cake. For a souffle, beat white of egg to a foam and gently fold into it white sauce made of fat, flour and milk with the yolk of the egg to enrich it and something to give it flavor. When you have baked it slowly in an oven with low heat, you have a souffle. A fluffy omelet is made this way, and cooked in a frying pan. A meringue, or a fruit whip follows the same principle--that is, cook with low heat and just long enough to be tender and not "fall".

Another important thing to know about white of egg proteins as a leaven is the effect of adding acid. Tomato juice in a fluffy omelet; cream of tartar in angel cake; or lemon juice in sponge cake increases the quantity of the egg foram, and makes it more tender.

Again, and still without cooking, there is the effect of the egg proteins in salad dressings. French dressing, though you can mix the oil and vinegar, will not stay mixed--the mixture, technically, is a temporary emulsion. But in mayonnaise, where you use egg with the oil and acid, you get a permanent emulsion, because the egg proteins have stabilized the mixture.

When heated, the proteins of the egg behave in other interesting ways important to the cook. Perhaps you use egg to clarify coffee, or soup. You put the egg white--only a little of it--into the cold liquid and it dissolves. But as it is heated it coagulates, and the particles of protein draw to themselves the coffee dust, or any fine particles there may be in the soup, and you can pour off, or strain out a clear liquid. You can use egg shells for this purpose, in fact, because a little of the egg white always clings to the shell--enough to clear your coffee.

When you poach an egg you drop it into boiling water (this is not breaking the rule against boiling temperature in egg cookery, because the egg itself cools the water instantly) and the sudden heat into which the egg falls coagulates the outside protein just enough to keep the egg whole while it cooks. Salt in the water, or a little vinegar, or a little of both, helps to keep the egg whole. But you do not let the water get back to boiling after the egg goes in. For a soft poached egg, you probably cover the pan, take it off the fire, and let it stand till the egg is firm enough to suit you. If you want the egg solid all through, you may keep it on the fire, but you keep the water at very low heat.

Cooking eggs in the shell takes more time than poaching, of course, because the shell is a poor heat-conductor and the heat cannot penetrate the egg itself so readily. But again, you don't let the water boil after you put in the egg. And when you fry eggs, you break them into a pan with a little fat just moderately hot.

You keep the heat low, so the eggs will be tender, and have no little frills of dried albumen around the edge.

In custards, you get the benefit of the thickening power of egg proteins. If you are making a "boiled" custard--which never should be boiled, of course, but just kept at an even heat in a double boiler over water that is not boiling hot--if you are making this kind of custard, you stir it gently while it is cooking, in order to get the thick, smooth, creamy consistency which makes the perfect soft custard. But if you are making baked custard, you do not stir the mixture while it is cooking. You keep the oven low, and you set the custard in a pan of water to make it cook slowly enough to form a "gel" that is firm but very delicate. But you don't keep it in the oven too long, because after a time, even with low heat, the custard will "separate"--which means that the proteins form a hard "coagulum" which separates from the liquid and you custard becomes watery.

Meat proteins and milk proteins behave in some special ways of their own, but the cooking principle is the same--control of the heat. Meat cookery is a story in itself, however, and so is the cooking of milk and cheese.

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